The Burden of Cardiovascular Disease in the State of Montana 2003

MONTANA
Department of Public Health & Human Services

MONTANA
CARDIOVASCULAR HEALTH PROGRAM

Montana Department of Public Health and Human Services
Cardiovascular Health Program

Cardiovascular Burden Report

Preface

To assist many agencies and communities in Montana, the Montana Cardiovascular Health Program issued the Montana Cardiovascular Disease Prevention and Control Plan in 2000. As part of the five-year plan, the Cardiovascular Disease/Obesity Prevention Task Force envisioned having Montana-specific data to guide efforts in reducing the health burden from coronary heart disease and stroke, the most common forms of cardiovascular disease. This report contains an in-depth picture of cardiovascular disease and its risk factors. It compares the trends in Montana to the United States (US) as a whole and to the Healthy People 2010 goals for the nation.

Acknowledgements

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- American Heart Association
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- Montana Cardiovascular Disease/Obesity Prevention Task Force

Executive Summary

Cardiovascular Disease Mortality in Montana

In 2000, Cardiovascular Disease (CVD) remained the leading cause of death in Montana with over 30% of all deaths attributed to heart disease (24.6%) and stroke (7.2%).

- Heart disease death rates were higher in the US than in Montana from 1990-2000, but in Montana, death rates did not decrease as rapidly over the decade.
- Stroke deaths rates for both Montana and the US were similar and declined at the same rate from 1990-2000.
- From 1990-2000, Montana's American Indians had a much smaller decrease in CVD deaths compared to the US and Montana as a whole. The heart disease death rate among Indians in Montana actually surpassed that of the US population during the decade.

Stroke death rates decreased 12% in Montana's sparsely populated frontier counties and almost 9% in the small urban counties from 1990-2000. Heart disease deaths also declined less rapidly (15%) in Montana's small urban counties compared to the frontier counties (23%).

Heart disease and stroke mortality declined over the last decade, but hypertension prevalence is increasing.

Cardiovascular Disease Risk Factors in Montana

- In 2001, over a quarter (26.8%) of all Montana adults reported a history of high blood pressure. Reported high blood pressure rates increased 8% in the past decade.
- Montana's American Indians reported having diabetes almost three times more often than all Montanans and the general US population in 2001. In addition, Indians with diabetes were five times more likely to have had a heart attack than those without diabetes.
- Montanans aged 65 or older are at higher risk for a heart attack or stroke, but they were less likely than younger adults to recognize all the symptoms of heart attack and stroke according to a recent survey.
- Montana high school students (9^{th} – 12^{th} grade) were less likely to eat at least 5 servings of fruits and vegetables a day (17.6% vs. 21.4%) compared to the US.

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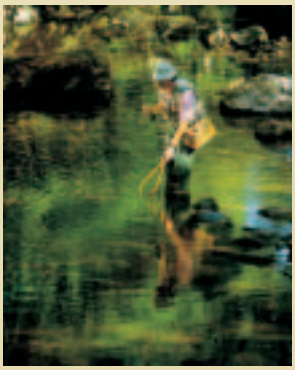

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Introduction

Cardiovascular disease (CVD) is the leading cause of death in the United States and in the state of Montana. The yearly Behavior Risk Factor Surveillance System (BRFSS) provides a valuable surveillance mechanism to assess trends in many important cardiovascular risk factors, and mortality statistics describe the magnitude and relative importance of heart disease and stroke in Montana. Overall, disease incidence and mortality vary by geographic location and ethnicity. Mortality from cardiovascular disease declined within the US, but after 1990, the rates of decline slowed.[1] Risk factors for heart disease and stroke remain highly prevalent, but the patterns vary in Montana's populations. Public health efforts to reduce cardiovascular disease must focus on priority populations and target the broad social and environmental factors that influence knowledge, attitudes and behaviors that contribute to the burden of heart disease in Montana.

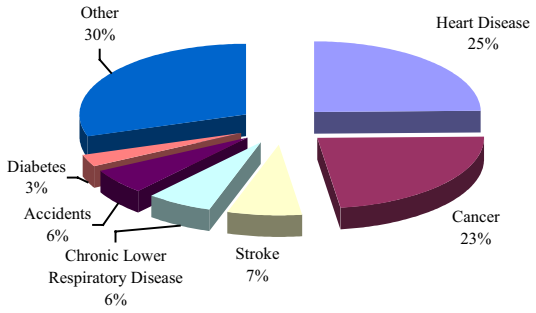
The purpose of this report is to highlight information that describes the burden of heart disease and stroke and their associated risk factors in Montana. Using data from the Office of Vital Statistics, BRFSS and a special American Indian BRFSS as well as Medicare hospitalization claims for Montana residents, this report presents data on the mortality from cardiovascular disease, heart disease, and stroke along with recent trends. In addition, information about the prevalence and trends in selected modifiable cardiovascular risk factors are presented, along with information about how well adults in Montana recognize the signs and symptoms of heart disease and stroke.

Note: Full methods on sources and limitations are located in Appendix A – Methods, data sources and limitations.

Leading Causes of Death in Montana and the US

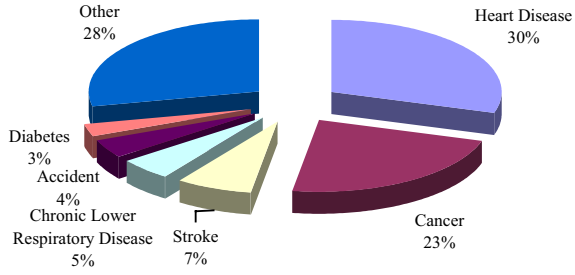
In Montana, over 30% of all deaths in 2000 were attributed to cardiovascular disease. Heart disease and stroke were the first and third leading causes of death in Montana, respectively. Heart disease mortality was slightly less in Montana than in the US, but the mortality rate from stroke was similar. For the decade from 1990-2000, the state of Montana averaged approximately 2,750 deaths each year from major cardiovascular disease, over 2000 from heart disease, and almost 550 from stroke during each year (data not shown).

Figure 1. Leading causes of death in Montana in 2000.



Source: Montana Office of Vital Statistics, Department of Public Health and Human Services. 2000.

Figure 2. Leading causes of death in the US in 2000.



Source: Centers for Disease Control and Prevention. National Vital Statistics Report. Deaths: Final Data for 2000.

Demographics of Montana

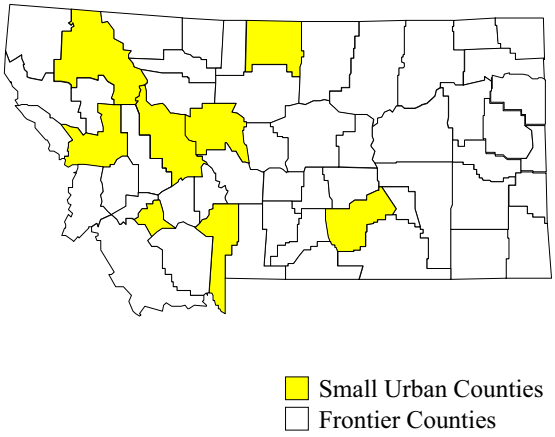
In 2002, the total population in Montana was 902,195. The median age was 37.5 years, 50.2% were women and 13.4% of Montana residents were 65 years of age or older. Ninety-one percent of the population was white, and Montana's largest ethnic population was American Indian. This minority group contributed 6.2% of the state's population.

Montana is large geographically but sparsely populated with a population density of only 6.2 persons per square mile. Over 60% of the population lives in one of eight counties. These counties, defined as "small urban," range in population from 16,673 to 129,352. A small urban county is defined as a non-metropolitan county with a city of ≥ 10,000 population or a county in metropolitan areas with less than 1 million population.[2] In contrast, the remaining 48 counties in Montana are defined as "frontier", meaning a non-metropolitan county without a city of 10,000 or more population.[2] Populations in the frontier counties ranged from 493 to 36,070 with seven of these counties having fewer than 1,500 residents and 44 of these counties having a population density of six or fewer persons per square mile.[3] This report compares trends in mortality between frontier and small urban counties.

Note: The terms "small urban" and "frontier" as used in this document are general descriptors only.

In 2000, the Behavioral Risk Factor Surveillance System (BRFSS) found that 14.9% of all Montanans reported having no health care coverage, and this rate of uninsured Montanans has remained relatively constant since 1991. However, the rate of uninsured Montana adults is higher than the comparable national figure of 11.8%.[4] Uninsured adult Montanans were likely to be younger and report lower incomes and less education than adults with health care coverage (data not shown).

Figure 3. Map of small urban and frontier counties in Montana.



I. Mortality From Cardiovascular Disease

A Note About the Statistics

Statewide cardiovascular disease, heart disease and stroke mortality trends are presented from 1990-2000. During this time period, mortality trends are presented by race (all Montanans, Montana American Indians, and the general US population), by sex (for all Montanans and the US population), and by Montana counties (small urban and frontier as well as the general US population). All data are from Montana's Office of Vital Statistics and the National Center for Health Statistics and are age-adjusted to the 2000 US standard population. For additional information regarding these analyses, please refer to Appendix A.

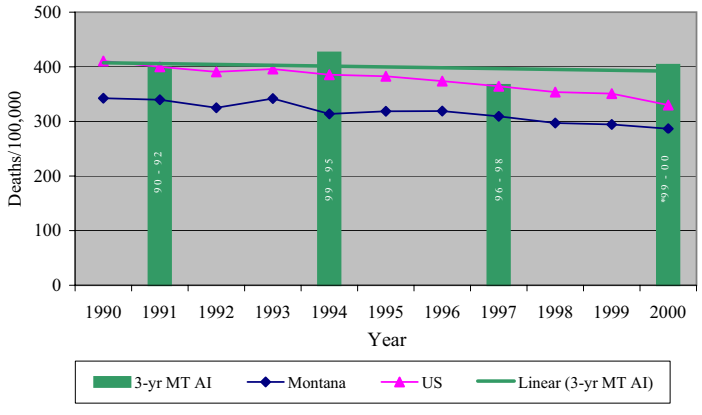
A. Cardiovascular Disease

Summary: Cardiovascular disease death rates declined for all Montanans, Montana American Indians and the general US population between 1990 and 2000. Although the general US population had higher mortality rates from 1990-2000, in Montana the rates declined less rapidly than in the general US population. The decline in CVD mortality was less for Montana's American Indian population. From 1990-1993, the CVD mortality rate for Montana American Indians was similar to the general US population rate. However, after 1993, the CVD mortality rate for Montana American Indians surpassed that of the general US population. CVD age-specific death rates increased sharply after age 55 years for all Montanans. Before age 45 years, CVD age-specific death rates were negligible for adult Montanans.

- In Montana, the overall age-adjusted CVD mortality rate in 2000 was 286.6 per 100,000. In the US, the mortality rate for CVD was 329.9 per 100,000. For Montana American Indians, the average annual CVD mortality rate in 1999-2000 was 403.7 per 100,000.

- From 1990-2000, CVD death rates decreased 19.7% for the entire nation while in Montana the CVD death rates declined 16.3%. However, for Montana American Indians, the rate of decline was less rapid, only 3.7%, during the same time period.

Figure 4. Age-adjusted cardiovascular disease mortality rates for all Montanans, Montana American Indians and the general US population. 1990-2000.[1][2]

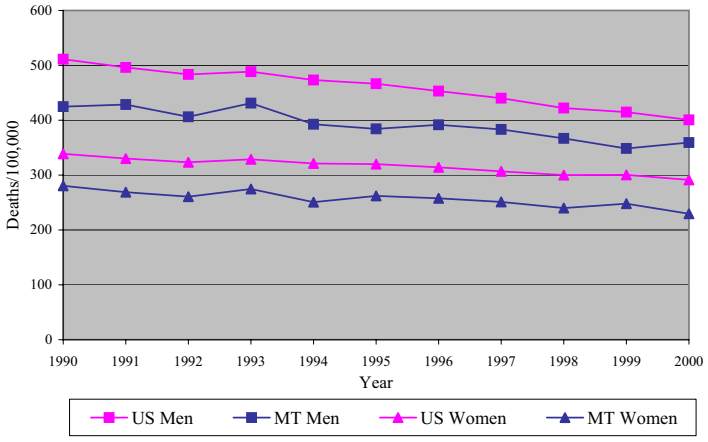


Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

*2-year average

Summary: The CVD mortality rates among both men and women in the US were higher when compared to Montana men and women, respectively. The rate of decline was less rapid for men in Montana than for men in the US. The CVD mortality rate for women from both the US and Montana declined only minimally compared to the decreasing rate for men.

Figure 5. Age-adjusted cardiovascular disease mortality rates for Montana and the US, by sex 1990-2000.[1][2]

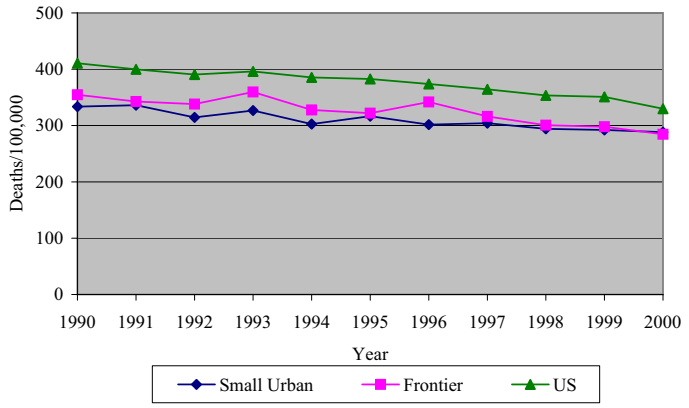


Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

- The 2000 CVD mortality rates were 400.5 per 100,000 for US men, 359.3 per 100,000 for Montana men, 291.3 per 100,000 for US women and 229.5 per 100,000 for Montana women.
- From 1990-2000, the overall age-adjusted CVD death rate decreased by 15.4% for Montana men and declined 18.2% for Montana women. For US men, the overall age-adjusted CVD mortality rate decreased 21.5%, and for US women, there was a decline of 14.2%.

Summary: From 1990-2000, the CVD mortality rates declined for Montana's frontier and small urban counties. Although the general US population had higher CVD mortality rates than both the frontier and small urban counties of Montana from 1990-2000, the rate of decline in the US was comparable to that in Montana's frontier counties. The rate declined less rapidly in the small urban counties of Montana.

Figure 6. Age-adjusted cardiovascular disease mortality rates for small urban and frontier counties in Montana and the general US population. 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

- The CVD mortality rate, for 2000, in Montana's small urban counties was 288.4 per 100,000, and for the frontier counties was slightly lower at 284.5 per 100,000.
- When compared to the 19.7% decrease in CVD mortality rate in the US, from 1990-2000, the decrease in Montana's frontier counties was similar, 19.8%, but the decline in small urban counties was only 13.5%.

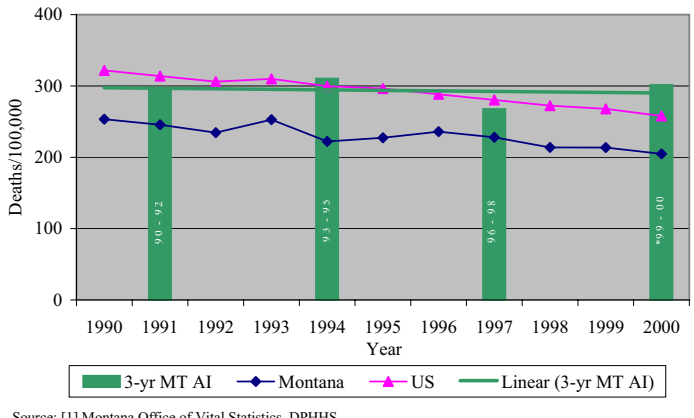
B. Heart Disease

Summary: For the general US population and Montana, heart disease mortality rates declined over the past decade. However, the decline in Montana was slightly slower than for the US. After 1996, the heart disease mortality rates for Montana American Indians remained relatively constant, and the mortality rates for heart disease in Montana's American Indian population exceeded comparable rates for both the general US population and Montana.

- The overall age-adjusted heart disease mortality rate, in 2000, was 204.7 per 100,000 for Montana, 257.9 per 100,000 for the general US population and 301.4 per 100,000 for Montana American Indians (annual average from 1999-2000).

- From 1990-2000, heart disease mortality rates declined almost 20% (321.8 per 100,000 to 257.9 per 100,000) for the general US population, about 19% (253.3 per 100,000 to 204.7 per 100,000) for all Montanans, but only 2.4% for Montana American Indians.

Figure 7. Age-adjusted heart disease mortality rates for all Montanans, Montana American Indians and the general US population. 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

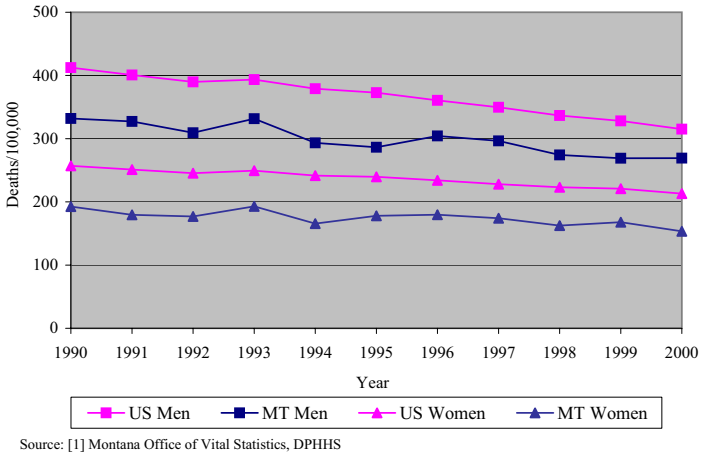
*2-year average

Summary: The overall age-adjusted heart disease mortality rates declined for Montana men and women and US men and women. The decline in heart disease mortality was less rapid for women than for men. However, the heart disease mortality rates remained higher in both US men and Montana men than the rates in women. Even though the heart disease death rate was higher for US men than in Montana men, the decline in heart disease mortality was steeper for US men from 1990-2000.

- In 2000, the overall age-adjusted heart disease mortality rate was 315.0 per 100,000 for US men, 269.2 per 100,000 for Montana men, 213.0 per 100,000 for US women and 153.4 per 100,000 for Montana women.

- From 1990-2000, heart disease mortality rates declined 24% (from 412.4 per 100,000 to 315.0 per 100,000) for US men and about 19% (from 332.0 per 100,000 to 269.2 per 100,000) for

Figure 8. Age-adjusted heart disease mortality rates for Montana and the US, by sex. 1990-2000.[1][2]

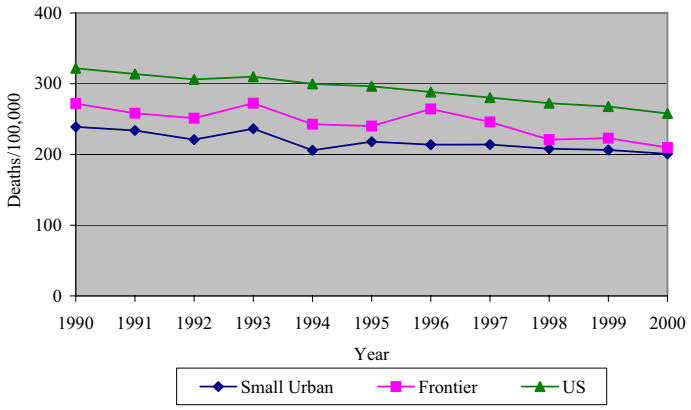


Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

Montana men. During the same time period, the rate of decline of heart disease mortality rates for US women was 17% (from 257.0 per 100,000 to 213.0 per 100,000) compared to a 20% decline for Montana women (from 192.6 per 100,000 to 153.4 per 100,000).

Summary: From 1990-2000, heart disease mortality rates in Montana's frontier and small urban counties declined slowly. Over the past decade, the heart disease mortality rate remained higher for the US compared to Montana, and the rate of decline was less rapid than in Montana's frontier counties. However, the difference in the heart disease mortality rates between Montana's small urban counties and the US became smaller from 1990-2000, resulting in a steeper decline for the US compared to the small urban counties of Montana.

Figure 9. Age-adjusted heart disease mortality rates for small urban and frontier counties in Montana and the general US population, 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

- In 2000, the overall age-adjusted heart disease mortality rate was 209.8 per 100,000 for Montana's frontier counties and 200.9 per 100,000 for the small urban counties.
- From 1990-2000, the heart disease mortality rate declined almost 23% (from 271.9 per 100,000 to 209.8 per 100,000) for frontier counties in Montana and decreased over 15% (from 238.9 per 100,000 to 200.9 per 100,000) in small urban counties.

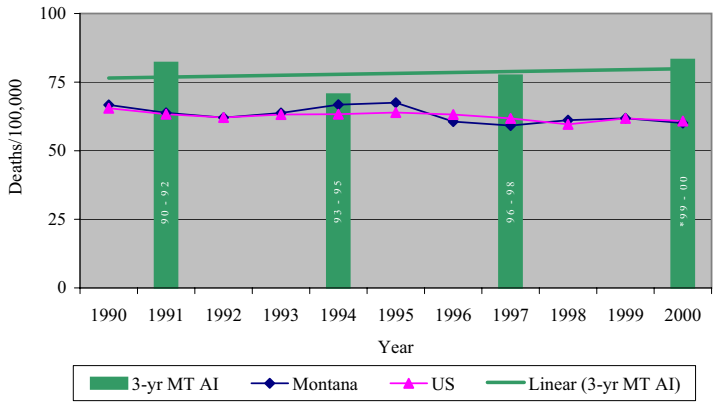
C. Stroke

Summary: Of the 2,779 CVD deaths in Montana in 2000, 583 (21%) deaths were due to stroke. From 1990-2000, stroke death rates for all Montanans and the general US population declined at almost the same rate. Montana American Indians experienced higher stroke mortality rates compared to either the general US population or Montana's total population and showed a slight increase in stroke mortality during the same time period.

- In 2000, the age-adjusted stroke mortality rate was 60.8 per 100,000 for the US, 60.1 per 100,000 for Montana, and 83.2 per 100,000 for Montana American Indians (2-year average from 1999-2000).

- From 1990-2000, stroke death rates declined almost 10% for all Montanans and over 7% for the general US population, but stroke death rates among Montana American Indians showed a slight increase of over 4%.

Figure 10. Age-adjusted stroke mortality rates for all Montanans, Montana American Indians and the general US population. 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

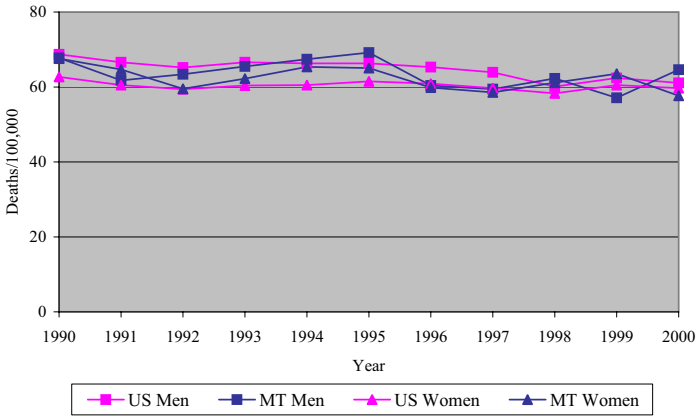
*2-year average

Summary: Although stroke mortality rates fluctuated for Montana's male and female population, the overall age-adjusted stroke mortality rates declined slightly from 1990-2000. The US male population showed a steady decline during the same time period, but the rate of decline was less significant for US women.

- In 2000, the age-adjusted stroke mortality rate was 61.1 per 100,000 for US men, 64.6 per 100,000 for Montana men, 59.7 per 100,000 for US women and 57.7 per 100,000 for Montana women.

- From 1990-2000, stroke death rates decreased about 11% for US men, almost 5% for Montana men and US women, and almost 15% for Montana women.

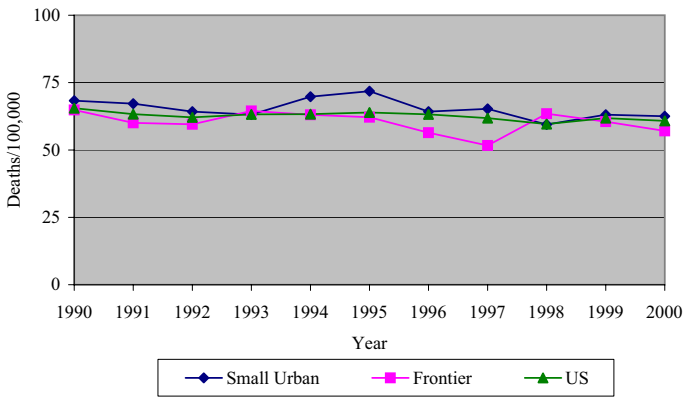
Figure 11. Age-adjusted stroke mortality rates for Montana and the US, by sex. 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

Summary: For the past decade, the stroke mortality rates declined slowly for Montana's small urban and frontier counties and the US. From 1990-1997, the small urban counties in Montana had higher stroke mortality rates than either the US or Montana's frontier counties. Although in 1998, the stroke mortality rate in Montana's frontier counties slightly exceeded that of the US and Montana's small urban counties, in 1999, the stroke mortality rate for Montana's frontier counties was again lower than that of the US and Montana's small urban counties.

Figure 12. Age-adjusted stroke mortality rates for small urban and frontier counties in Montana and the general US population, 1990-2000.[1][2]



Source: [1] Montana Office of Vital Statistics, DPHHS
[2] National Center for Health Statistics

- For 2000, in Montana the age-adjusted stroke mortality rate was 57.1 per 100,000 for frontier counties and 62.5 per 100,000 for small urban counties compared to 60.8 per 100,000 for the US.
- From 1990-2000, the stroke mortality rate declined from 64.9 to 57.1 per 100,000, a decrease of almost 12%, for Montana's frontier counties, and from 68.3 to 62.5 per 100,000, a 9% decrease, for Montana's small urban counties.

II. Modifiable Cardiovascular Risk Factors

The American Heart Association has identified several risk factors for cardiovascular disease. Among these are "modifiable" risk factors – those factors that can be modified or controlled through lifestyle changes and/or medication (i.e., cigarette smoking, elevated blood pressure, high blood cholesterol, diabetes, obesity, poor dietary habits, and physical inactivity) and "non-modifiable" risk factors that include age, gender and heredity.

To compare Montana status to the Healthy People 2010 goals for the US[5], we identified individual objectives that corresponded to information in the BRFSS and compared them to the actual status of Montanans according to BRFSS in 2001.[6] When possible, trend analyses are also presented from 1990-2001.

Table 1. Montana's 2000 Cardiovascular Disease/Healthy People 2010 objectives and 2001 BRFSS prevalence for Montana.

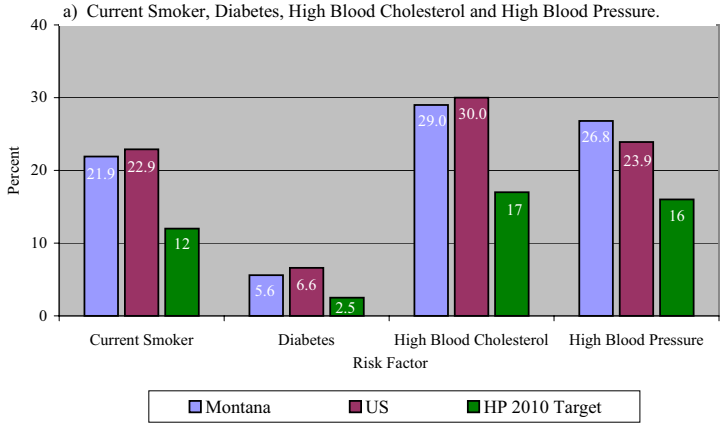
Montana's 2000 Cardiovascular Disease/ Healthy People 2010 Objectives	Target (%)	Montana BRFSS (%)
Reduce the proportion of adults with high blood pressure (12-9)	≤ 16	*26.8
Increase the proportion of people with high blood pressure who are taking action to help control their blood pressure (12-11)	≥ 95	**91
Reduce the proportion of adults with high total blood cholesterol (12-14)	≤ 17	*29.0
Increase the proportion of adults who have had their blood cholesterol checked within the preceding 5 years (12-15)	≥ 80	69.9
Reduce cigarette smoking by adults (27-1)	≤ 12	21.9
Increase the prevalence of healthy weight BMI† (18.5 – 25.0 kg/m^2) among all people 20 years and older (19-1)	≥ 60	43.2
Reduce the proportion of adults who are obese (19-2)	≤ 15	18.8
Reduce the portion of adults who engage in no leisure-time physical activity (22-1)	≤ 20	21.9
Increase the proportion of people aged 18 and over who engage regularly, preferably daily, in sustained physical activity for at least 30 min. per day (22-2)	≥ 30	51.2
Reduce overall cases (per 100 population) of diabetes that is clinically diagnosed (5-3)	≤ 2.5	5.6
Increase the proportion of people aged 2 and older who consume at least two daily servings of fruit (19-5)	≥ 75	††24.4
Increase the proportion of people aged 2 and older who consume at least 3 daily servings of vegetables, with at least a third being dark green or deep yellow vegetables (19-6)	≥ 50	

Source: Montana Cardiovascular Disease Prevention and Control Plan, Montana Department of Public Health and Human Services
* 1999 BRFSS prevalence
** Cardiovascular Disease Consumer Telephone Survey, MT DPHHS, 1999
† Body Mass Index
†† Consume 5 or more servings of fruits and vegetables per day

A. Comparison of Montana 2001, US 2000 to Healthy People 2010 Goals for the US

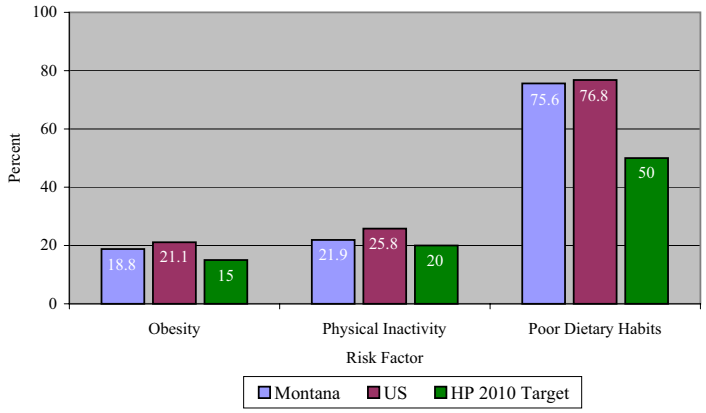
Figure 13. Proportion of adults, in Montana and the US, reporting CVD behavior risk factors, including Healthy People 2010 targets. 2001 [1][2][3]

a) Current Smoker, Diabetes, High Blood Cholesterol and High Blood Pressure.



Source: [1] Montana BRFSS
[2] BRFSS, CDC
[3] US DPHHS, Healthy People 2010

Figure 13b) Obesity, Physical Inactivity, and Poor Dietary Habits. 2001.[1][2][3]



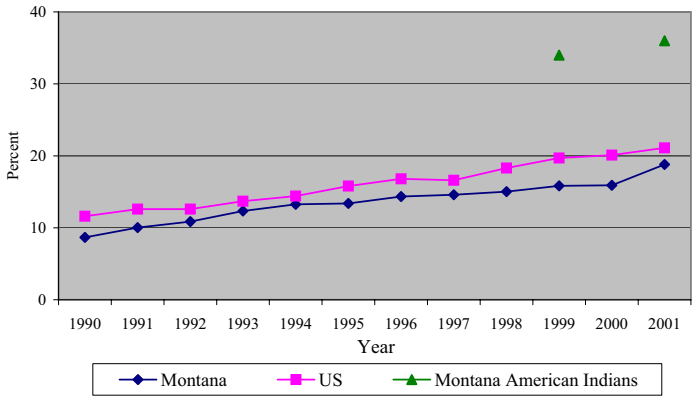
Source: [1] Montana BRFSS
[2] BRFSS, CDC
[3] US DPHHS, Healthy People 2010

Summary: The patterns of modifiable cardiovascular risk factors reported by adults in Montana were very similar to those reported in the US. In 2001, adult Montanans smoked slightly less compared to the US adults (21.9% vs. 22.9%, respectively) and reported less diagnosed diabetes (5.6% vs. 6.6%). In addition, the proportion of adult Montanans that reported a history of high cholesterol was essentially the same as for US respondents (29.0% vs. 30.0%, respectively) although Montanans were less likely to be obese (18.8% vs. 21.1%). Adults from Montana were less sedentary (No leisure time physical activity was 21.9% for Montana vs. 25.8% for the US), but reported a similar level of dietary consumption of at least five servings of fruits and vegetables daily (24.4% for Montanans vs. 23.1% for the general US). Montana adults, however, were more likely to report a history of high blood pressure (26.8% vs. 23.9%) compared to the US as a whole.

Obesity (defined as Body Mass Index ≥ 30 kg/m^2)

Summary: The prevalence of obesity increased steadily both in Montana and the US from 1990-2001. Although the US continued to have higher rates compared to Montana, the trend increased more rapidly in Montana in recent years. From 1999-2001, the prevalence of obesity for Montana American Indians was over 1.5 times higher than the general US population and Montana, with a prevalence ranging from 34% to 36%. For all Montanans, the prevalence of obesity increased 10.1 percentage points from 8.7% in 1990 to 18.8% in 2001, and two percentage points for Montana American Indians from 34% to 36% from 1999 to 2001. In the US, the prevalence of obesity increased 9.5 percentage points from 11.6% in 1990 to 21.1% in 2001.

Figure 14. Trends in prevalence of obesity* among all Montanans, Montana American Indians and the US. 1990-2001 [1][2][3]



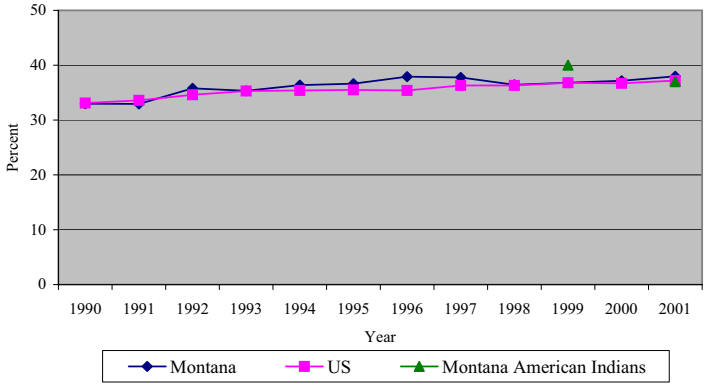
Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC

*BMI ≥ 30.0 kg/m^2

Overweight (defined BMI = 25.0 to 29.9 kg/m^2)

Summary: From 1990-2001, the prevalence of overweight slowly increased both in Montana and the US. In 1990, almost 33% of all Montanans and 33.1% of the US were overweight. In 1999, the first year of the adapted American Indian BRFSS survey, 40% of Montana's American Indian population reported being overweight. In 2001, 38% of all Montanans reported being overweight, an increase of five percentage points over the past decade. For the US population, the prevalence of overweight rose just over four percentage points to 37.1% during the same time period. The prevalence of overweight reported by Montana American Indians in 2001 was 37%.

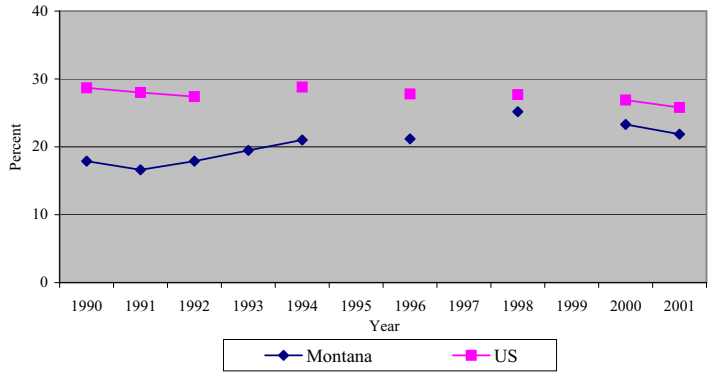
Figure 15. Trends in prevalence of overweight* among adults from all Montanans, Montana American Indians and US. 1990-2001. [1][2]



Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC

* BMI=25.0-29.9 kg/m^2

Figure 16. Trends in prevalence of physical inactivity* among Montana adults and the US. 1990-2001.[1][2]



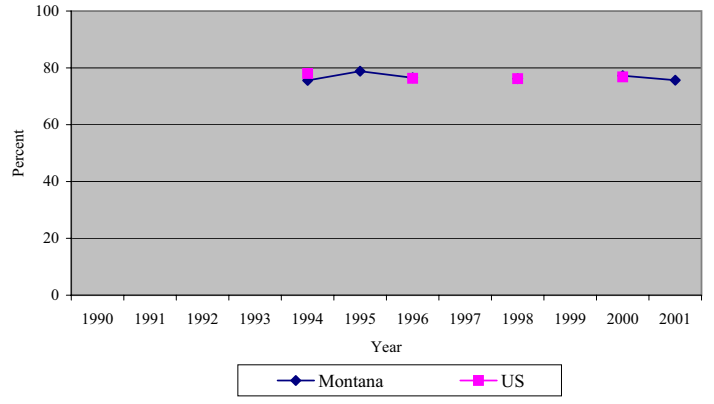
Source: [1] Montana BRFSS
[2] BRFSS, CDC
Physical activity questions not asked in 1995, 1997, and 1999 for Montana.
Physical activity questions not asked in 1993, 1995, 1997 & 1999 for US.

No leisure time physical activity

Physical Inactivity (defined as no leisure time physical activity)

Summary: Adult Montanans became less active over the past decade. The prevalence of reported physical inactivity showed a steady increase from 1990-2001 from 18% to approximately 22%. During the last decade, however, adult Montanans were less sedentary than adults in the US. In 1991 the prevalence of physically inactivity for the US was 28% and was similar in 2001 at 25.7%.

Figure 17. Trends in prevalence of inadequate 5 A Day consumption among adult Montanans and the US. 1990-2001. [1][2]



Source: [1] Montana BRFSS
[2] BRFSS, CDC
Nutrition questions not asked for 1990-1993, 1997 and 1999 for Montana.
Nutrition questions not asked for 1990-1993, 1995, 1997, 1999 and 2001 for the US.

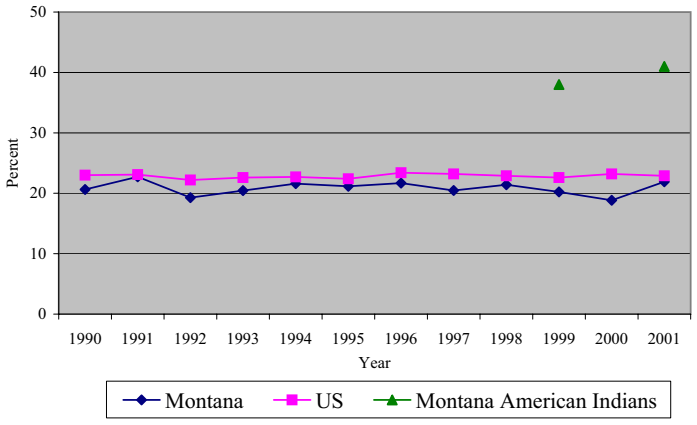
Poor Dietary Habits

Summary: Dietary habits as measured by self-reported consumption of five or more servings of fruits and vegetables a day (5 A Day) did not improve in the past 6 years. Montana BRFSS data indicate that 76% to 79% of adult Montanans consume fewer than 5 A Day from 1994-2000. Similarly, in the US, in 1994, approximately 78% of the US population reported eating fewer than 5 A Day, and in 2000, the prevalence remained relatively unchanged at 77%.

Current Tobacco Use

Summary: Adults in Montana reported current use of tobacco at slightly lower rates than adults in the US. However, among US adults, the trend remained constant from 1990-2001; in Montana, tobacco use increased. For Montana American Indians during 1999-2001, the prevalence of current smoking was almost double that of all Montanans and the general US population. In 1990, the prevalence of current smoking was 20.6% among all Montanans and 23% in the general US population. For Montana American Indians, the prevalence was 38% in 1999. In 2001, 21.9% of all Montanans and 41% of American Indians in Montana reported current use of tobacco.

Figure 18. Trends in prevalence of current tobacco use for all Montanans, Montana American Indians and US. 1990-2001.[1][2][3]

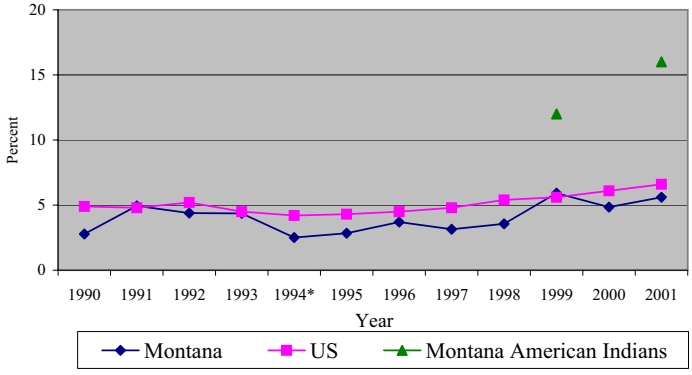


Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC

Diabetes

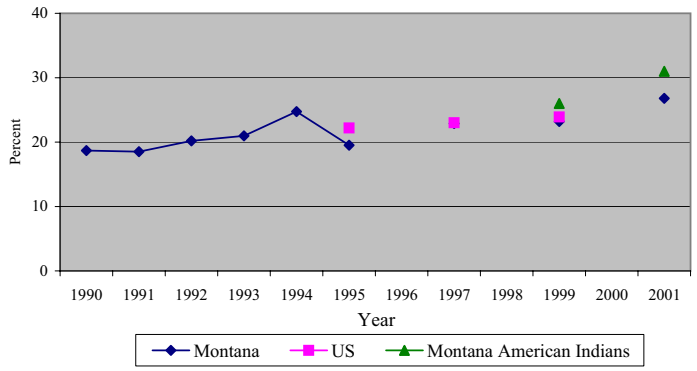
Summary: From 1990-2001, the prevalence of diabetes reported by adults in the US and Montana steadily increased. Compared to both Montana and the general US population, American Indian Montanans reported diabetes over twice as frequently in 1999, and at almost three times higher rates in 2001. For adult Montanans, there was a three-percentage point increase in prevalence of self-reported diabetes from 2.8% in 1990 to 5.6% in 2001. In the general US population, the rate increased 1.7 percentage points from 4.9% in 1990 to 6.6% in 2001. Although the prevalence of self-reported diabetes was higher in the general US population compared to Montana, the percent change, from 1990-2001, was 1.5 times higher for Montana than for the US. Among Montana American Indians the diabetes prevalence increased four percentage points from 12% in 1999 to 16% in 2001.

Figure 19. Trends in prevalence of diabetes for all Montanans, Montana American Indians and the US. 1990-2001[1][2][3]



Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC
* Question changed in 1994 to exclude females with gestational diabetes.

Figure 20. Trends in prevalence of high blood pressure for all Montanans, Montana American Indians and the US. 1990-2001.[1][2][3]

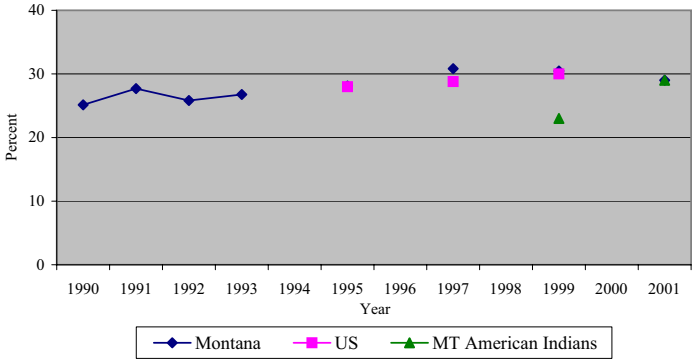


Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC
Blood pressure questions not asked in 1996, 1998 and 2000 for Montana.
Blood pressure questions not asked in 1990-1994, 1996, 1998, 2000 and 2001 for the US.

High Blood Pressure

Summary: Over a quarter (26.8%) of all Montana adults reported a history of high blood pressure in 2001. In Montana, the self-reported high blood pressure rate increased 8.1 percentage points from 18.7% in 1990 to 26.8% in 2001. In the general US population, the comparable prevalence was 23.9% in 1999. In 1999, 26% of Montana American Indians reported high blood pressure, and in 2001, this prevalence increased by five percentage points to 31%.

Figure 21. Trends in prevalence of high blood cholesterol for all Montanans, Montana American Indians and the US. 1990-2001.[1][2][3]



Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC
Cholesterol questions not asked in 1994, 1996, 1998 and 2000 for Montana.
Cholesterol questions not asked in 1990-1994, 1996, 1998, 2000 and 2001 for the US.

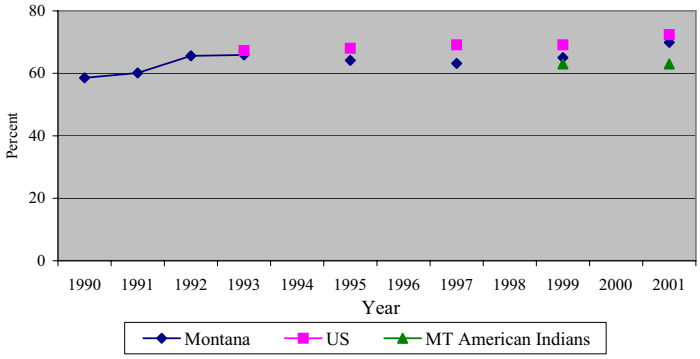
High Blood Cholesterol

Summary: The percent of Montana adults reporting a history of high blood cholesterol increased from 1990-2001. Among American Indians in Montana, the rates also increased from 1999-2001. In the general US population, there was only a slight increase between 1995 and 1999. In 1990, 25.1% of Montana adults reported having high blood cholesterol; in 2001 the rate increased to 29%. In 1999, 23% of Montana American Indians reported having high blood cholesterol, and the rate increased to 29% in 2001. Comparable US rates showed only a slight increase from 28% in 1995 to 30% in 1999.

Blood Cholesterol Screening

Summary: Adult Montanans who reported having their blood cholesterol checked at least once in the past five years, increased 11.3 percentage points from 58.6% in 1990 to 69.9% in 2001. In the general US population, the percentage of adults who reported having their blood cholesterol checked in the past five years increased from 67.3% in 1993 to 72.4% in 2001. However, only 63% of American Indian Montanans reported having their blood cholesterol checked in the past five years, and the rate remained constant from 1999-2001. For the general US population, the prevalence of persons who had blood cholesterol tested in the past five years remained higher compared to Montana, but the absolute percentage point increase (from 1990-2001) for Montana was double that of the US.

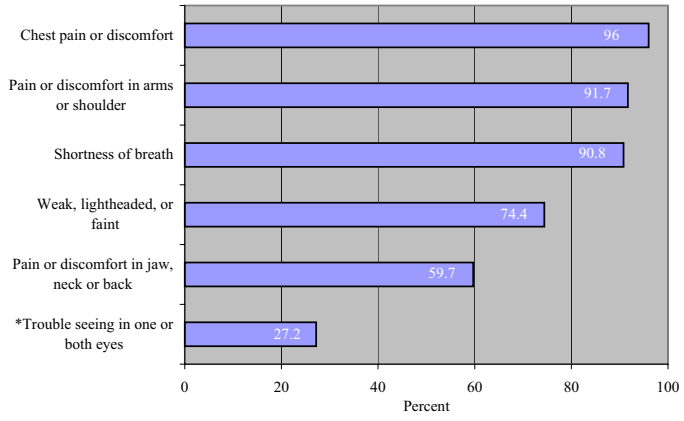
Figure 22. Trends in prevalence of cholesterol screening (in past 5 years) for all Montanans, Montana American Indians and the US. 1990-2001.[1][2][3]



Source: [1] Montana BRFSS
[2] Montana adapted BRFSS of AI, 1999 and 2001
[3] BRFSS, CDC
Cholesterol questions not asked in 1994, 1996, 1998 and 2000 for Montana.
Cholesterol questions not asked in 1990-1992, 1994, 1996, 1998, and 2000 for the US.

III. Knowledge of Signs and Symptoms of Heart Attack and Stroke

Figure 23. Prevalence of heart attack signs and symptoms awareness among Montana adults. 2001



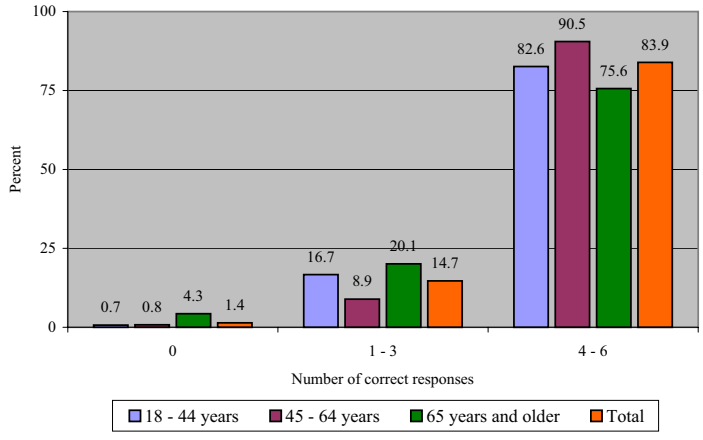
Source: Montana BRFSS
* Correct response = No

Heart Attack

Overall, over 90% of all respondents were aware of heart attack symptoms pertaining to chest pain/discomfort, pain or discomfort in arm or shoulder, and shortness of breath. Less than 75% of respondents correctly identified feeling weak, lightheaded or faint (74.4%) and pain or discomfort in the jaw, neck, or back (59.7%) as symptoms for a heart attack. Men were significantly less likely to recognize pain or discomfort in the jaw, neck or back as symptoms of a heart attack compared to women (56.1 % vs. 63.1%) (data not shown). The majority of respondents (81.5%) were aware that they should call 911 if someone is having a heart attack or stroke. Men (78.3%) were less likely to be aware of calling 911 if someone is having a heart attack or stroke compared to women (84.7%).

Montana adults, aged 18-44 years, were significantly less likely to recognize jaw, neck or back pain or discomfort as heart attack symptoms compared to older respondents. Compared to respondents aged 45-64 years, younger respondents were less likely to be aware that pain or discomfort in arms or shoulder could be symptoms of heart attack. Older Montanans (aged ≥ 65 years) were less likely to identify being weak, lightheaded or faint, chest pain or discomfort, arm or shoulder pain or discomfort, or shortness of breath as heart attack symptoms compared to younger respondents. Montana adults, aged 45-64 years, (90.5%) were more likely to correctly identify four or more signs and symptoms of heart attack compared to younger Montana adults, aged 18-44 years, (82.6%) and older adults, aged 65 years and older (75.6%). However, only 39.3% of adult Montanans knew all symptoms of heart attack (including "no" on the decoy symptom).

Figure 24. Prevalence of correct responses to questions about heart attack signs and symptoms among Montana adults, by age. 2001

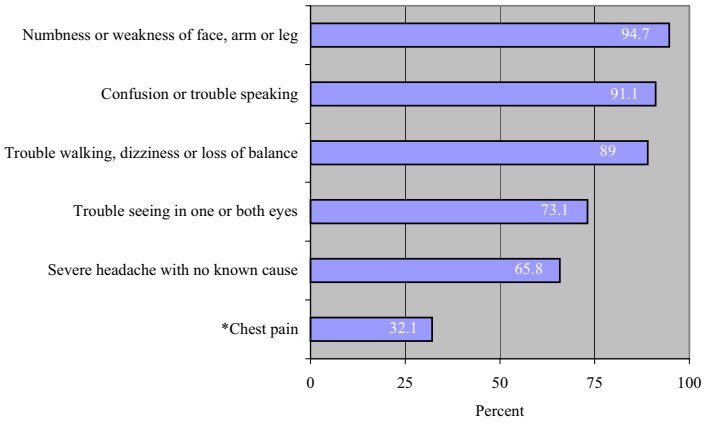


Source: Montana BRFSS

Stroke

Over 88% of Montana respondents were likely to recognize confusion or trouble speaking, numbness or weakness of face, arm or leg, and trouble walking, dizziness or loss of balance as stroke symptoms. Fewer respondents were aware that trouble seeing in one or both eyes was a stroke symptom. Only 65% were aware that severe headache with no known cause can be a symptom of stroke. Men were less likely than women to identify confusion or trouble speaking and severe headache as stroke symptoms. However, women were less likely than men to recognize that chest pain or discomfort was not a stroke symptom (data not shown).

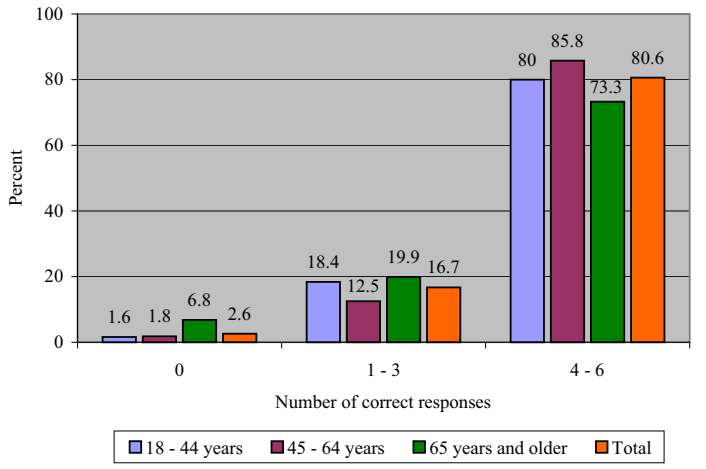
Figure 25. Prevalence of stroke signs and symptoms awareness among Montana adults. 2001



Source: Montana BRFSS
* Correct response = No

Older Montanans (aged ≥ 65 years) were less likely than younger Montanans to identify that numbness or weakness of face, arm or leg and trouble walking, dizziness or loss of balance as symptoms of stroke. In addition, older respondents were less likely to be aware that confusion or trouble speaking, trouble seeing in one or both eyes, and severe headache with no known cause were stroke symptoms compared to respondents aged 45-64 years. Montanans aged 45-64 years were more likely to recognize confusion or trouble speaking as a stroke symptom compared to younger (aged 18-44 years) or older (aged ≥ 65 years) respondents. Montana adults aged 65 years and older (73.3%) were less likely to correctly identify four or more signs and symptoms of stroke compared to younger Montanans (80.0% of those aged 18-44 years and 85.8% of those aged 45-64 years). However, only 18.7% of Montana adults knew all symptoms of stroke (including "no" on the decoy symptom).

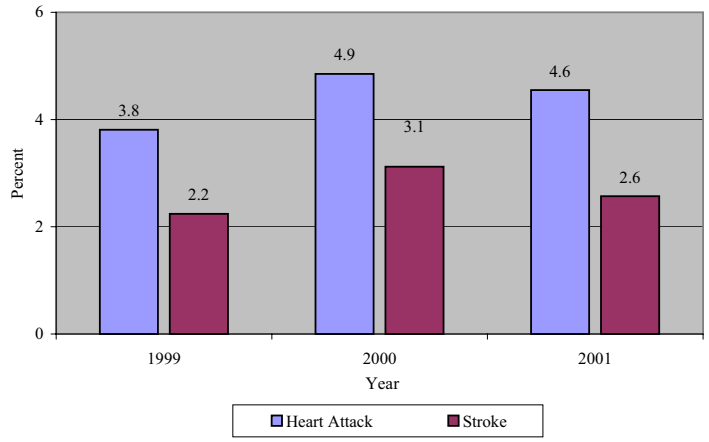
Figure 26. Prevalence of correct responses to questions about stroke signs and symptoms among Montana adults, by age. 2001.



Source: Montana BRFSS

There was no difference in heart attack and stroke awareness between white and non-white respondents, among respondents with reported diabetes compared to those without diabetes, and among respondents with high blood pressure compared to those without high blood pressure (data not shown).

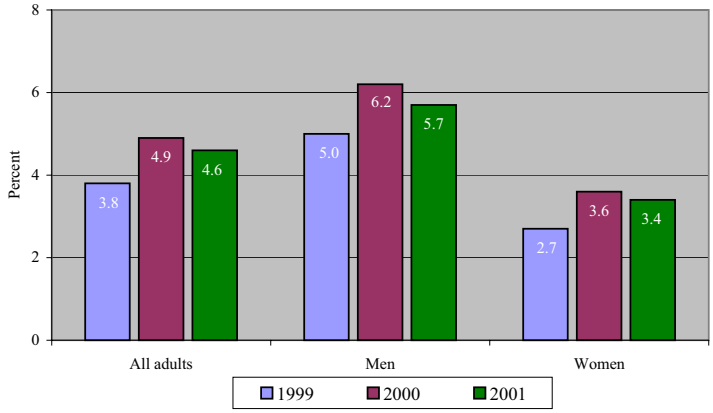
Figure 27. Proportion of Montana adults who report ever having a heart attack or stroke. 1999-2001.



Source: [1] Montana BRFSS

Figure 28. Proportion of Montana adults who reported ever having a heart attack, 1999-2001.

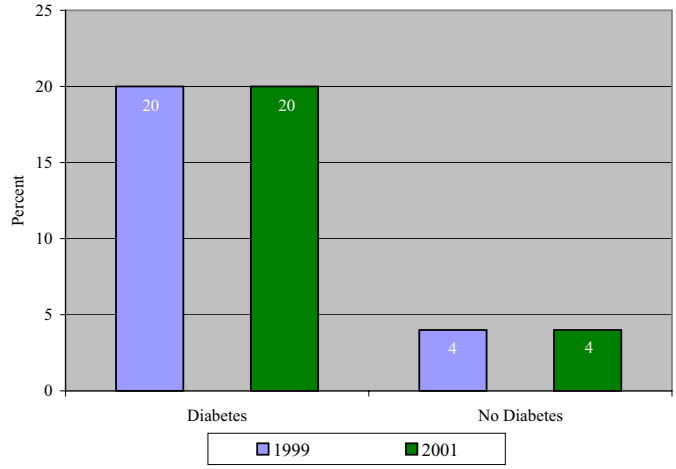
a) by sex.



Source: Montana BRFSS

Figure 28. Proportion of adult American Indians who reported ever having a heart attack, 1999 and 2001.

b) by diabetes status



Source: Montana adapted AI BRFSS, 1999 and 2001.

IV. Self-Reported Cardiovascular Disease

A. Heart Attack, Stroke and Angina

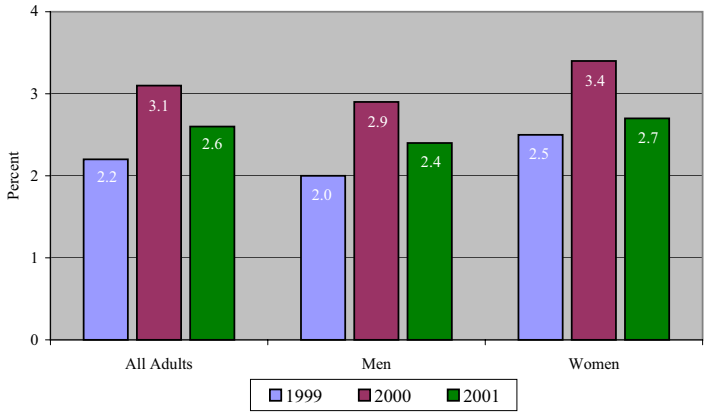
Summary: The percentage of Montana's adult population who reported having experienced a heart attack increased from 3.8% in 1999 to 4.6% in 2001. Older individuals were more likely to report being told they had a heart attack. In 2001, 12.8% of those aged 65 and over reported a history of heart attack, but only 1.7% of those between 45 and 54 years of age reported a similar history. Although men were almost two times more likely than women to report having a heart attack, the increase in reported heart attacks was the same for both men and women. Among Montana American Indians, the prevalence of a reported heart attack was five times higher for those with diabetes (20%) compared to American Indians without a history of diabetes (4%). The prevalence of heart attack reported by American Indians with and without diabetes remained constant between 1999 and 2001.

The overall prevalence of stroke reported in Montana did not change significantly from 1999 (2.2%) to 2001 (2.6%). Women reported stroke more commonly than men. Almost 8% of Montanans aged 65 and older reported a stroke history in 2001 compared to 1% of those in the 45 to 54 years old age group. For Montana American Indians with diabetes, the prevalence decreased four percentage points over two years (from 8.0% in 1999 to 4.0% in 2001). Among Montana American Indians without diabetes, stroke prevalence was similar to the overall prevalence of all Montanans.

Among American Indians, epidemiologic studies of cardiovascular disease and its risk factors showed that diabetes was the strongest risk factor for heart disease in the tribes studied[7]. American Indians in Montana also have high rates of diabetes and heart disease. And both the rates of disease and the frequency of risk factors including smoking and overweight are high in Montana's American Indian population[8].

Figure 29. Proportion of Montana adults who reported ever having a stroke, 1999-2001.

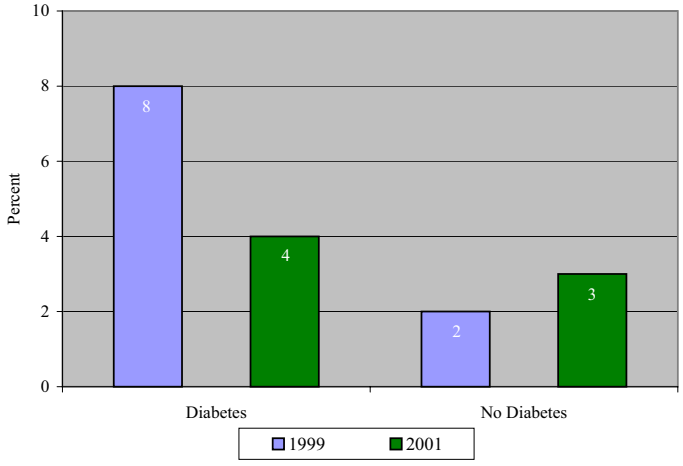
a) by sex.



Source: Montana BRFSS

Figure 29. Proportion of adult Montana American Indians who reported ever having a stroke, 1999 and 2001.

b) by diabetes status



Source: Montana adapted AI BRFSS, 1999 and 2001.

Figure 30. Incidence of AMI hospitalizations among Montana Medicare beneficiaries, by year of admission, by sex, 1995-2000

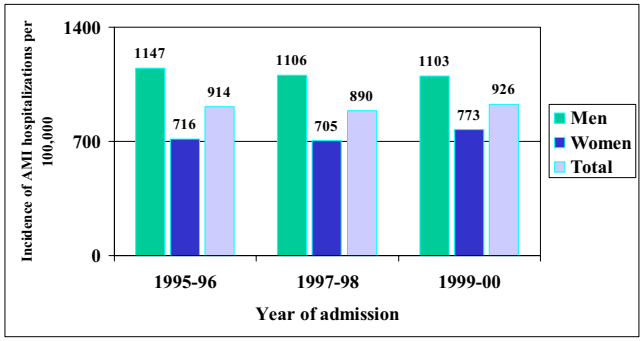


Figure 31. Incidence of AMI hospitalizations among Montana Medicare beneficiaries, by year of admission, by age, 1995-2000.

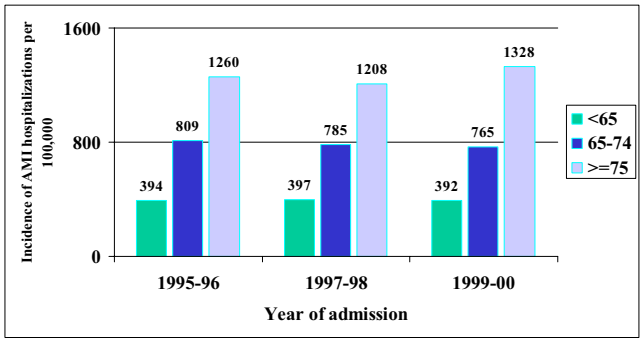
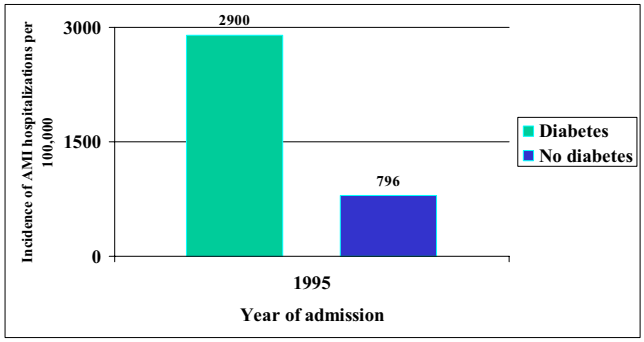


Figure 32. Incidence AMI hospitalizations among Montana Medicare beneficiaries, by year of admission, by diabetes discharge diagnosis, 1995.



V. CVD Hospitalizations for Montana Medicare Beneficiaries

In Montana, the number of hospitalizations for acute myocardial infarctions (AMI) increased slightly from 2,512 in 1995 to 2,642 in 2000. Montana men were more likely to be hospitalized for an AMI than Montana women. From 1995-2000, the incidence of AMI hospitalization for men decreased, but the incidence of AMI hospitalizations for women increased.

The incidence of AMI hospitalizations among Montana Medicare beneficiaries increased with age. For Montanans under 65 years of age, AMI hospitalizations were unchanged from 1995-2000. For the same 5-year period, AMI hospitalizations decreased slightly for Montanans aged 65-75 years (from 809 per 100,000 in 1995-1996 to 765 per 100,000 in 1999-2000). However, AMI hospitalizations among Montanans 75 years of age and older increased from 1,260 per 100,000 in 1995-1996 to 1,328 per 100,000 in 1999-2000.

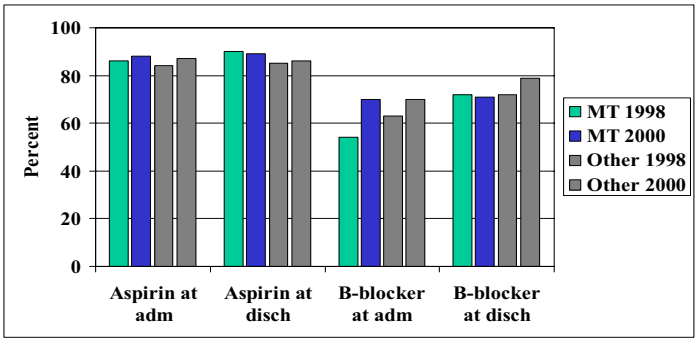
In 1995, Montana Medicare beneficiaries with diabetes listed at discharge (2,900 per 100,000) were over 3.5 times more likely to have been hospitalized for an AMI compared to individuals who did not have diabetes listed (796 per 100,000).

VI. Secondary Prevention of Heart Disease in Montana

The Centers of Medicare and Medicaid Services (CMS) collected comparison data from 19 states including Montana to assess secondary prevention services for Medicare beneficiaries during hospitalizations for AMI[9]. In 1998 and 2000, Montana Medicare beneficiaries with an AMI were more likely to receive ASA (aspirin therapy) at admission and at discharge compared to the average rates in all states. In 1998 over 50% of Montanans received beta-blockers at admission compared to over 60% for other states. In 2000, 70% of Medicare beneficiaries in Montana received beta-blockers, a rate equivalent to that in the other states. The percent of Medicare beneficiaries receiving beta-blockers at discharge was the same for Montana and all states in 1998. In 2000, the percent of Medicare beneficiaries in Montana receiving beta-blockers at discharge was unchanged from 1998, but the rate in all states increased to about 80%.

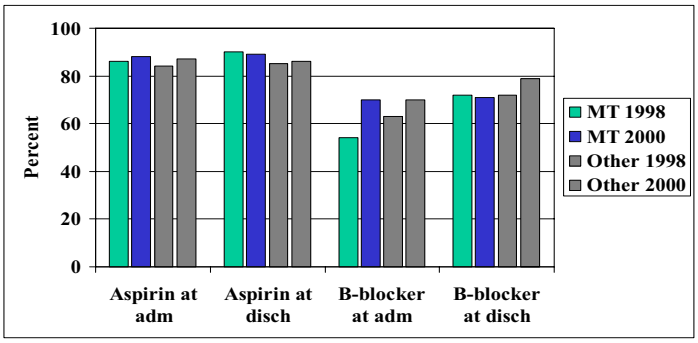
In 1998, less than 60% of Montana beneficiaries received an angiotensin-converting enzyme inhibitor (ACE-I) at discharge. In 2000, the rate increased to almost 70%, reaching or exceeding the aggregate rate for 18 states. For 1998, smoking cessation counseling for Montana beneficiaries with an AMI exceeded 60% compared to about 45% for the other states. However, in 2000, smoking cessation counseling dropped in Montana and in the other states the rates were only slightly over 40%.

Figure 33a. Percent of Medicare beneficiaries with an acute myocardial infarction who received secondary prevention services, 1998-2000; aspirin at admission (adm) and discharge (disch), and B-blocker at admission and discharge.



*CMS 2001, Comparison data from 19 States

Figure 33a. Percent of Medicare beneficiaries with an acute myocardial infarction who received secondary prevention services, 1998-2000; aspirin at admission (adm) and discharge (disch), and B-blocker at admission and discharge.



*CMS 2001, Comparison data from 19 States

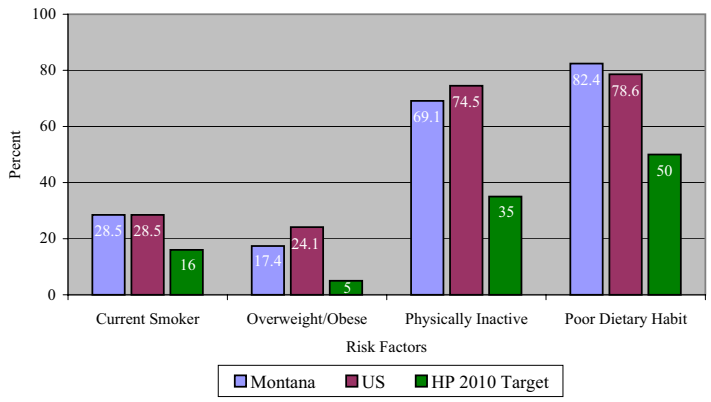
VII. Modifiable Cardiovascular Risk Factors among Montana's Youth (9th through 12th grades)

Table 2. Montana's 2000 Cardiovascular Disease/Healthy People 2010 objectives and 2001 Youth Risk Behavior Survey (YRBS) prevalence for Montana and the US.[1]

Montana's 2000 CVD Objectives/ Healthy People 2010 Objectives	Target (%)	US YRBS (%)	Montana YRBS
Reduce cigarette smoking among adolescents in grades 9-12. (27-2)	≤ 16	28.5	28.5
Reduce the proportion of children and adolescents who are overweight or obese. (19-3)	≤ 5	24.1	17.4
Increase the proportion of young people in grades 9-12 who engage in moderate physical activity for at least 30 minutes on ≥ 5 days of the previous 7 days. (22-6)	≥ 35	25.5	30.9
Increase the proportion of people aged 2 and older who consume at least two daily servings of fruit (19-5)	≥ 75	*21.4	*17.6
Increase the proportion of people aged 2 and older who consume at least 3 daily servings of vegetables, with at least a third being dark green or deep yellow vegetables (19-6)	≥ 50		

Source: [1] Youth Risk Behavior Survey (YRBS)– United States, 2001. Morbidity and Mortality Weekly Report Surveillance Summary June 28, 2002/51(No.SS-4);1-62.
*Consume 5 or more servings of fruits and vegetables per day.

Figure 34. Proportion of adolescents (9th - 12th grade), in Montana and the US, reporting CVD risk factors, and Healthy People 2010 targets. 2001[1][2][3]



Source: [1]Montana YRBS
[2] YRBS - US 2001
[3] US DPHHS, Healthy People 2010

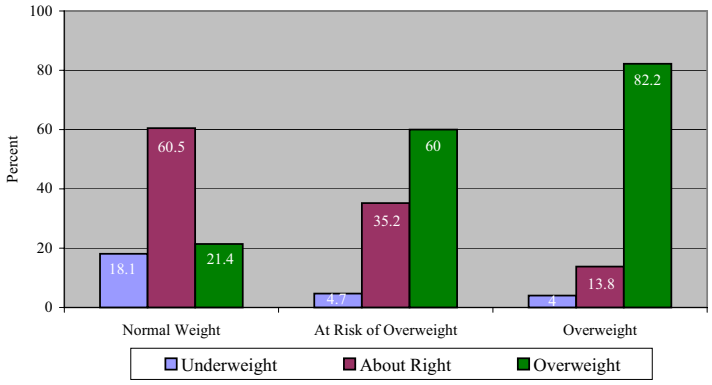
Summary: The prevalence of modifiable risk factors reported by adolescents (9th through 12th grades) in Montana varied somewhat from those reported in the US. In 2001, Montana adolescents were less likely to be overweight or obese than US adolescents (17.4% vs. 24.1%, respectively) and were more likely to participate in moderate physical activity (30.9% vs. 25.5%). However, Montana adolescents were less likely to eat at least 5 servings of fruits and vegetables a day (17.6% vs. 21.4%) compared to the US. For both Montana and the US, almost one-third (29%) of high school students reported that they are current smokers (they smoked in the past 30 days).

Montana adolescent's perception about their weight

Summary: For 2001, of the 2,755 students surveyed in the Montana YRBS, 83% were normal weight (NW defined as less than the 85th percentile of CDC growth chart[10], 11% were at risk of being overweight (AROW defined as greater than or equal to the 85th percentile but less than the 95th percentile) and 6% were overweight (OW defined as greater than or equal to the 95th percentile). Normal weight students were more likely to have a varied perception of their weight compared to AROW and OW students. Normal weight adolescents were less likely to perceive being overweight compared to AROW and OW adolescents (21% for NW vs. 60% for AROW and 82% for OW). However the perception of being about right was only 61% for NW students and decreased for AROW (35%) and OW (14%) students.

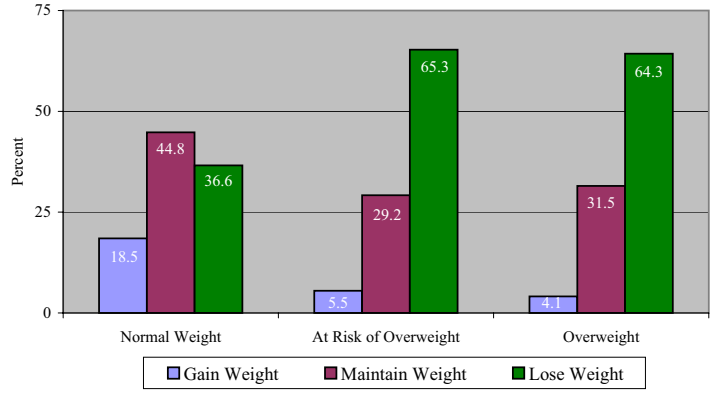
In 2001, less than 50% of Montana adolescents (9th through 12th grade) were trying to maintain their weight (45% NW, 29% AROW and 32% OW). Almost two thirds of AROW and OW students were attempting to lose weight compared to over one third of NW students. Of NW Montana students, almost 20% were trying to gain weight, yet 6% of AROW and 4% of OW were also trying to gain weight.

Figure 35. Percent of Montana adolescents' (9th - 12th grade) perception about their weight, by BMI classification*. 2001.



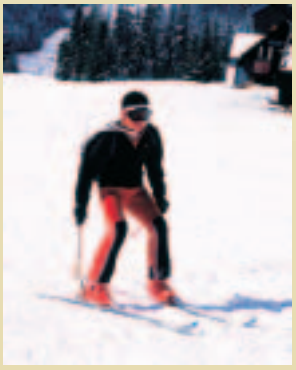
*Normal Weight (BMI < 85th percentile), At Risk of Overweight (BMI = 85th to < 95th percentile), Overweight (BMI >= 95th percentile). BMI = Body Mass Index (kg/m^2)
Source: Montana YRBS

Figure 36. Percent of Montana adolescents' (9th - 12th grade) weight management goals, by BMI classification*. 2001



*Normal Weight (BMI < 85th percentile), At Risk of Overweight (BMI =85th to < 95th percentile), Overweight (BMI >= 95th percentile). BMI = Body Mass Index (kg/m^2)
Source: Montana YRBS

In 2001, 48% of Montana students did not attend at least one physical education (PE) class in an average week. Almost 80% of 9th and 10th grade students in Montana attended at least one PE class in an average week compared to only 20% of 11th and 12th grade students. In Montana, high schools are required to have only one credit of health enhancement class during the 9th and 10th grades. In addition, students who attended at least one PE class a week (63%) were more likely to exercise 5 or more days a week compared to those who did not attend one PE class (37%) (data not shown).



Discussion and Conclusion:

Cardiovascular disease (including heart disease and stroke) is the leading cause of death in Montana. Over the past decade, death rates from cardiovascular disease decreased more slowly in Montana than in the US. Men continued to have higher heart disease death rates than women. In contrast, stroke death rates have not changed substantially in either the US or Montana over the past decade. Of particular concern for Montana is the slower decline in cardiovascular disease death rates in urban counties compared to the more-sparsely populated counties. In addition, cardiovascular disease death rates in American Indians have remained almost unchanged over the past decade.

Modifiable risk factors for CVD are common in Montana, and the trends show that the levels of obesity, physical inactivity, diabetes, high blood pressure and high blood cholesterol increased steadily from 1990 to 2001. Smoking rates did not improve over the same time period. Montanans also failed to increase their consumption of an adequate number of fruits and vegetables (5 A Day) in their diets. American Indian adults in Montana continued to smoke and to report having diabetes and high blood pressure more frequently than all Montanans and the US over the decade.

Heart attack and stroke are not rare events. In 2000, over 2,600 Medicare beneficiaries in Montana were hospitalized for a heart attack. Many hospitals focused special efforts to reduce recurrent heart attacks, but opportunities for improvement remain. The majority of Montanans recognized most of the signs and symptoms of heart attack and stroke. Older individuals however, were less likely than younger people to realize that dizziness, numbness and weakness of the face, arm or leg and difficulty walking could be associated with stroke.

In summary, the burden of cardiovascular disease is high in Montana, and the risk factors are increasing. American Indians are at very high risk for cardiovascular disease with particularly high rates of diabetes and cigarette smoking contributing to the risk. Achieving national Healthy People 2010 goals will require the cooperative efforts of communities, Indian tribes, public health organizations, clinicians, worksites and voluntary health organizations to assist individuals to achieve healthier lifestyles and thus decrease the burden of cardiovascular disease in Montana.

Appendix A – Methods, Data Sources and Limitations

1. Mortality: All Montana cardiovascular disease deaths from 1990 to 2000 were identified through death record information collected by the Office of Vital Statistics, Montana Department of Public Health and Human Services.[11] Bureau of Census data were used for 1990 and 2000 population, and inter-censal population estimates were used for 1991-1999.[12]

Beginning with mortality data for 1999, the Montana Office of Vital Statistics began reporting underlying causes of death information by ICD-10. Prior to 1999, underlying causes of death information were reported by ICD-9. Each new version of the ICD code introduces challenges with the development of comparable mortality data classified with different versions of the code. The National Center for Health Statistics (NCHS) attempts to quantify the effects of ICD revisions for each category of interest by calculating a ratio of the number of deaths classified in the latest version to that classified in the previous version. "Comparability ratios" provide estimates of change attributed to the revision alone and help distinguish "coding changes" from "real changes". The comparability ratios, ICD-9 and ICD-10 codes used to define cerebrovascular disease, heart disease and cardiovascular disease are listed below.

Cause of Death	1990-1998 ICD-9 codes	1999-2000 ICD-10 codes	Comparability Ratio
Cerebrovascular disease	430-434, 436-438	I60-I69	1.0588
Heart disease	390-398, 402, 404, 410-429	I00-I09, I11, I13, I20-I51	0.9858
Cardiovascular disease	390-448	I00-I78	0.9981

Annual mortality rates were calculated from 1990-2000. The rates were age-adjusted to the US 2000 standard population. US mortality data were obtained through the use of the National Center for Health Statistics website.[13] For Montana's American Indian population, an average annual direct age-adjusted (to the US 2000 standard population) rate was calculated for a 3-year period from 1990-1998 and a 2-year average for 1999-2000. Age-adjusted mortality rates for Montana's small urban and frontier counties were calculated using Montana's county-specific populations from 1990-2000.

Definitions used for Montana's "small urban" and "frontier" counties were based on the five urbanization levels classification obtained from the Office of Management and Budget as used in *Health, United States, 2001 with Urban and Rural Health Chartbook*.[3] During the past decade, Montana's total population did not exceed 1 million people; therefore, we combined small metropolitan counties (of which Montana has 2) and non-metropolitan counties with a city of 10,000 or more population (of which Montana has 6) into the category we defined as "small urban". The remaining 48 counties, defined as non-metropolitan counties without a city of 10,000 or more population we defined as "frontier". The terms "small urban" and "frontier" as used in this document are general descriptors only.

Limitations: First, inconsistent and inaccurate race coding for American Indians in death records have been documented. Such findings suggest death rates for Montana American Indians are underestimated overall. The findings also indicate that American Indians who do not live on or near reservations are more likely to be misclassified as non-American Indians at the time of death. Therefore, current available mortality estimates for Montana American Indians who reside outside reservations may be systematically lower than the actual death rate for these persons.[14] Second, because Montana's American Indian population had small number of deaths due to CVD, heart disease and stroke, three years of data were combined to obtain a sufficiently large sample for analysis. Calculating mortality rates over a period of several years may reduce the impact of chance variability in rates based on small numbers; however, such rates can conceal changes in trends that took place during 1990-2000.

2. Modifiable CVD Risk Factors for All Montanans: From 1990-2001, data on the seven modifiable risk factors for CVD were obtained from data collected using the Montana Behavior Risk Factor Surveillance System (BRFSS).[15] The Montana BRFSS is an ongoing state-based, telephone survey to gather information regarding personal practices, attitudes, and knowledge of non-institutionalized adult Montanans (18 years of age and older) that contribute to the leading causes of disease in the state. For Montana, data were weighted to account for differences in the probability of selection and to more closely reflect the adult population. For the US population (including District of Columbia and Puerto Rico), the median of the prevalence was used.[4]

BRFSS questions asked and definitions:

1. Have you ever been told by a doctor that you have diabetes?
2. Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?
3. Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?
4. A current smoker is defined as someone who has ever smoked 100 cigarettes and who now smokes every day or some days.
5. According to the National Heart, Lung and Blood Institute (1998), persons with a BMI $\geq$ 30 kg/m^2 are at risk for being obese and BMI $\geq$ 25 kg/m^2 are at risk of being overweight.
6. Physical inactivity is defined as no leisure-time physical activity.

Limitations: Respondents may have a tendency to under-report behaviors that are socially undesirable, unhealthy or illegal (e.g., drinking and driving or smoking), while over-reporting desirable behaviors (e.g., exercise and healthy eating). The accuracy of self-reported information also is affected by the ability to fully recall past behaviors or health screening results.

Telephone surveys exclude households without telephones, which may result in a biased survey population due to under-representation of certain segments of the population. An estimated four percent of Montana households are without telephones and may represent a population segment at high risk of preventable disease associated with low socioeconomic status.

3. Modifiable CVD Risk Factors for Montana American Indians: In addition, the Montana Department of Public Health and Human Services (DPHHS), in collaboration with the Billings Area Indian Health Service, conducted an adapted BRFSS telephone survey of adult American Indians living

on or near Montana's seven reservations in 1999 and 2001.[16] Trained interviewers made telephone calls to a random sample of households with three-digit telephone prefixes located on or near the seven reservations in Montana. The number of completed telephone calls was proportional to the number of American Indians living on each reservation according to the 1990 census. Persons 18 years of age and older, who reported being American Indians were eligible to participate in the survey. A total of 1,000 and 1,006 surveys of American Indian adults were completed in 1999 and 2001, respectively.

Limitations: A number of limitations exist for these analyses. First, the survey was conducted by telephone and does not reflect the experience of adult American Indians living on or near the reservations without telephones. Second, Montana Indians who do not live on or near the reservations were not included in the survey. Finally, there is a potential for recall bias, as self-reported information regarding CVD and modifiable risk factors was used.

4. Self-Reported Cardiovascular Disease: Montana BRFSS was used to assess the prevalence of heart attack or myocardial infarction and stroke from 1999-2001.

BRFSS questions asked:

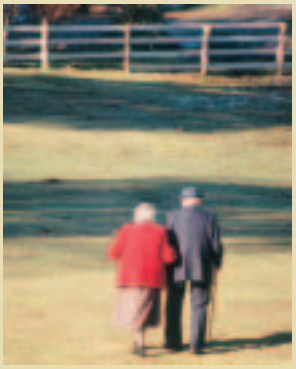
1. Has a doctor, nurse, or other health professional ever told you that you had a heart attack, also called a myocardial infarction (MI)?
2. Has a doctor, nurse or other health professional ever told you that you had a stroke?

Limitations: See number 2 above.

5. CVD Hospitalizations for Montana Medicare Beneficiaries: From 1995-2000, Medicare hospitalization claims data for Montana residents aged 65 years and older were analyzed for acute myocardial infarction (AMI).[17] AMI was defined by ICD-9 CM diagnosis codes 410.xx, excluding 410.x2.

Limitations: Since only Montana Medicare beneficiaries aged 65 years and older were analyzed, results cannot be generalized to populations under 65.

6. Knowledge of Signs and Symptoms of Heart Attack and Stroke: In 2001, the Montana BRFSS (see number 2 in Appendix A) included questions pertaining to signs and symptoms of heart attack and stroke (6 questions each). The correct response for 5 of the questions, for each of the heart attack and stroke sections, was "yes". Both the heart attack and stroke sections included one decoy question that required a "no" response.



Limitations: In addition to limitations described in #2 above, respondents were asked to indicate which of the possible signs and symptoms described by the interviewer were a sign or symptom of heart attack and stroke. Aided questions may overestimate AMI and stroke awareness and unaided questions may underestimate awareness. These findings are limited to adults from Montana, and our findings may not be representative of adults from other geographic regions.

7. Modifiable CVD Risk Factors among Montana's Youth: The Youth Risk Behavior Survey (YRBS) is an epidemiologic surveillance system developed cooperatively by the Centers for Disease Control and Prevention (CDC), 19 other federal agencies, and state and local departments of education to measure the extent to which adolescents engage in health risk behaviors.[18] These

behaviors included those that result in intentional and unintentional injuries, tobacco use, alcohol and other drug use, sexual behaviors that result in HIV infection, other sexually transmitted diseases, and unintended pregnancies, physical inactivity and dietary excesses and imbalances.

All public schools in Montana with students in grades 9-12 were eligible to be selected for inclusion in the sample. For 2001, 48 of the 54 schools (88.9%) randomly selected elected to participate with a total of 2,755 high school students participating in the survey.

YRBS questions asked:

1. During the past 30 days, on how many days did you smoke cigarettes?
2. How tall are you without your shoes on?
3. How much do you weigh without your shoes on?
4. On how many of the past 7 days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors?
5. 5 A Day consumption was a calculated variable that includes answers to 6 questions (Q83-Q88).

Limitations: First, these data apply only to adolescents who attend high school and are therefore not representative of all persons in this age group. Second, adolescents may have a tendency to under-report behaviors that are socially undesirable, unhealthy or illegal (e.g., drinking and driving or drug use), while over-reporting desirable behaviors (e.g., exercise and healthy eating). Third, BMI is calculated based on self-reported height and weight and tends to underestimate the prevalence of at risk of becoming overweight and overweight. Finally, data are not available from all 50 states.

8. Dodge Data Systems - Special Analysis: Data from the YRBS were analyzed for this special report. The BMI variable was calculated for each respondent that reported both weight and height. BMI = weight (kg)/ (height*height) (meters). Television watching was reclassified as less than 2 hours and 2 or more hours. PE class attendance was reclassified as none and 1 or more classes per week. Vigorous physical activity (activities that made you sweat or breathe hard for at least 20 min.) was reclassified as 0-4 days and $\geq$ 5 days in past 7 days. Describing weight was reclassified as underweight (very or slightly underweight), about the right weight, and overweight (very or slightly overweight). What are you trying to do about weight was reclassified as lose weight, gain weight and maintain weight (stay the same weight and I am not trying to do anything about my weight).

In addition to questions 2-5 above, the following questions were analyzed:

1. On an average school day, how many hours do you watch TV?
2. In an average week when you are in school, on how many days do you go to physical education (PE) classes?
3. On how many of the past 7 days did you exercise or participate in physical activity for at least 20 minutes that made you sweat and breathe hard, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing or similar aerobic activities?
4. Which of the following are you trying to do about your weight?
5. How do you describe your weight?

All the limitations that pertain to the YRBS also pertain to this report.

Appendix B – Montana Counties

Counties in Montana

County	Population[3]	Persons/sq. mile[3]
Small Urban		
Cascade	80,357	29.8
Flathead	74,471	14.6
Gallatin	67,831	26.0
Hill	16,673	5.8
Lewis & Clark	55,716	16.1
Missoula	95,802	36.9
Silverbow	34,606	48.2
Yellowstone	129,352	49.1
Frontier		
Beaverhead	9,202	1.7
Big Horn	12,671	2.5
Blaine	7,009	1.7
Broadwater	4,385	3.7
Carbon	9,552	4.7
Carter	1,360	0.4
Chouteau	5,970	1.5
Custer	11,696	3.1
Daniels	2,017	1.4
Dawson	9,059	3.8
Deer Lodge	9,417	12.8
Fallon	2,837	1.8
Fergus	11,893	2.7
Garfield	1,279	0.3
Glacier	13,247	4.4
Golden Valley	1,042	0.9
Granite	2,830	1.6
Jefferson	10,049	6.1
Judith Basin	2,329	1.2
Lake	26,507	17.7

County	Population[3]	Persons/sq. mile[3]
Frontier		
Liberty	2,158	1.5
Lincoln	18,837	5.2
McCone	1,977	0.7
Madison	6,851	1.9
Meagher	1,932	0.8
Mineral	3,884	3.2
Musselshell	4,497	2.4
Park	15,694	5.6
Petroleum	493	0.3
Phillips	4,601	0.9
Pondera	6,424	4.0
Powder River	1,858	0.6
Powell	7,180	3.1
Prairie	1,199	0.7
Ravalli	36,070	15.1
Richland	9,667	4.6
Roosevelt	10,620	4.5
Rosebud	9,383	1.9
Sanders	10,227	3.7
Sheridan	4,105	2.4
Stillwater	8,195	4.6
Sweet Grass	3,609	1.9
Teton	6,445	2.8
Toole	5,267	2.8
Treasure	861	0.9
Valley	7,675	1.6
Wheatland	2,259	1.6
Wibaux	1,068	1.2

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